User's Manual

RI850V4 V2

Real-Time Operating System

User's Manual: Analysis

Target Device

RH850 Family (RH850G3K)

RH850 Family (RH850G3M)

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(2012.4)

How to Use This Manual

Readers

This manual is intended for users who design and develop application systems using RH850 family products.

Purpose

This manual is intended for users to understand the functions of task analyzer tool manufactured by Renesas Electronics, described the organization listed below.

Organization

This manual consists of the following major sections.

1. GENERAL
2. FUNCTIONS
A. WINDOW REFERENCE

How to Read This Manual

It is assumed that the readers of this manual have general knowledge in the fields of electrical engineering, logic circuits, microcontrollers, C language, and assemblers.

To understand the hardware functions of the RH850 family.
-> Refer to the User's Manual of each product.

Conventions

Data significance:	Higher digits on the left and lower digits on the right
Note:	Footnote for item marked with Note in the text
Caution:	Information requiring particular attention
Remark:	Supplementary information
Numeric representation:	Decimal ... XXXX
	Hexadecimal ... 0xXXXX

Prefixes indicating power of 2 (address space and memory capacity):

K (kilo)	$2^{10} = 1024$
M (mega)	$2^{20} = 1024^2$

Related Documents

The related documents indicated in this publication may include preliminary versions. However, preliminary versions are not marked as such.

Document Name		Document No.
RI Series	Start	R20UT0751E
	Message	R20UT0756E
RI850V4 V2	Coding	R20UT2889E
	Debug	R20UT2890E
	Analysis	This manual

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1. GENERAL

CS+ is an integrated development environment for the development of application systems for microcontrollers manufactured by Renesas Electronics. CS+ allows the user to perform a series of operations including design, coding, build, and debugging.

Of such a series of development processes, this manual describes a task analyzer tool which is an effective tool for analyzing processing programs (tasks, interrupt handlers, etc.) using the features of real-time OS "RI850V4".

1.1 Overview

With the increasing sophistication and high functionality of microcontrollers, the processing programs have become increasingly large and complex.

Given such a processing program, the conventional debugger, while adequate in performing the logical analysis of a processing program, runs into difficulties when confronted with such time-related analysis requirements as processing execution timing issues and overall system performance evaluation. As a result, performing such analyses using the conventional debugger has required enormous time.

In response to such a market condition, Renesas Electronics, while providing powerful microcontrollers including the RH850 family, is offering a task analyzer tool with the objective of aiding the quantitative analysis of processing programming.

The task analyzer tool is intended for the analysis of the execution transition state of the processing program incorporating real-time OS "RI850V4" for the RH850 family, the state of real-time OS resource usage, the CPU usage status, and so forth. Through linkage to CS+, the task analyzer tool provides the functions of capturing event occurrences (the issuing of service calls, the generation of interrupts, etc.) as trace data and graphically displaying the information.

Consequently, by using the task analyzer tool, the user can easily analyze the state of processing program execution, the state of real-time OS resource usage, the CPU usage status, and so forth.

1.2 Features

The task analyzer tool provides the following features:

- Displays the processed program
  Through the graphical display of the execution transition state of a processing program incorporating RI850V4, the task analyzer tool can explicitly analyze the execution transition state of the processing program involving task switching based on service call issuance, control transfer to the interrupt handler occasioned by the generation of an interrupt, and so forth.
- Displays the Real-time OS resource usage status
  When a service call is issued by the processing program, the task analyzer tool can display the status of access to real-time OS resources (including semaphores and event flags) as an event mark. In this manner, the task analyzer tool permits the explicit analysis of the usage status of various real-time OS resources.
- Displays the CPU usage status
  By displaying the CPU usage status of the processing program (CPU usage rate, total execution time, etc.) in table form, the task analyzer tool permits the quantitative analysis of processing program execution time.
- Linkage to CS+
  The capability to jump from the task analyzer tool to the Editor panel, the Disassemble panel, etc. of CS+ permits the speedy identification.

2. FUNCTIONS

This chapter describes the principal functions provided by the task analyzer tool, along with operating procedure.

2.1 Overview

The task analyzer tool can be used to verify analysis information (the state of processing program execution, the state of real-time OS resource usage, the CPU usage status, etc.) that dynamically changes according to the state of execution of the processing program.

The task analyzer tool requires the following operating procedure:

(1) Start CS+
From the Windows [Start] menu, launch CS+.

Remark For details on "Start CS+", see the "CS+ Integrated Development Environment User's Manual: Project Operation".

(2) Read a project
Read the project to be analyzed.

Remark For details on "Read a project", see the "CS+ Integrated Development Environment User's Manual: Project Operation".

(3) Select debug tool
Select the type of debug tool to be used for the analysis of the execution status of the processing program.

Remark For details on "debug tool", see the "CS+ Integrated Development Environment User's Manual: RH850 Debug Tool".

(4) Verify the trace mode
Verify that the settings in the [Selection of trace mode] on the [Task Analyzer] tab on the Property panel match the settings that were specified when the load module was generated.

Remark 1. For details on the "[Task Analyzer] tab", see the "RI850V4 V2 Real-Time Operating System User's Manual: Coding".

Remark 2. When generating a load module, CS+ references the content of the [Selection of trace mode] settings and generates a load module that is optimal for the trace mode.

(5) Download the load module
Download the load module to be analyzed to the debug tool.

Remark 1. For details on "Download the load module", see the "CS+ Integrated Development Environment User's Manual: RH850 Debug Tool".

Remark 2. The task analyzer tool performs various types of analysis using the symbol information that is embedded in the load module. Therefore, downloading the load module to be analyzed requires that "Yes" is set in [Download File Settings] tab >> [Download] category >> [Download files] >> [[*n*]] >> [Download symbol information] on the [Download File Settings] tab on the Property panel.

(6) Open Realtime OS Task Analyzer Panel
Open the Realtime OS Task Analyzer panel that displays analysis information (the state of processing program execution, the state of real-time OS resource usage, the CPU usage status, etc.).
When opening this panel, make sure the mark located at the right edge of the Status bar is set to .

Remark If the Status bar mark is , it is an indication that the task analyzer tool is in a condition where it cannot perform various types of analysis.
The reason that the mark is set to can be checked from the tool tip which is displayed when the mouse cursor is placed on the mark.

(7) Set breakpoints
Set breakpoints on the starting and ending positions of a trace interval to be analyzed for the load module.

Remark For details on "Set breakpoints", see the "CS+ Integrated Development Environment User's Manual: RH850 Debug Tool".

(8) Execute load module
Execute the load module to the trace starting position.

Remark For details on "Execute the load module", see the "CS+ Integrated Development Environment User's Manual: RH850 Debug Tool".

(9) Set Trace Start Event
When the execution of the load module is started, set a trace start event by which CS+ acquires trace data.

(10) Execute load module
Execute the load module to the trace ending position.

Remark For details on "Execute the load module", see the "CS+ Integrated Development Environment User's Manual: RH850 Debug Tool".

(11) Verify analysis information
The analysis information obtained through the operations described in Steps (7) to (10) is displayed in the Child-panel display area on the Realtime OS Task Analyzer panel.
From the content of the display, verify items such as the state of processing program execution, the state of real-time OS resource usage, the CPU usage status, etc.

Remark 1. Updating timing for the analysis information which is displayed in the Child-panel display area on the Realtime OS Task Analyzer panel can be selected from the drop-down list located on the Toolbar.

The newest (Update)	Updates the analysis information which is displayed in the Child-panel display area when the execution of the load module stops or when this item is selected.
Not update	Does not update the analysis information which is displayed in the Child-panel display area when the execution of the load module stops.

Remark 2. Units of time displayed in the Child-panel display area on the Realtime OS Task Analyzer panel (such as Total Execution Time, and Average Execution Time) can be selected from the drop-down list located on the Toolbar.

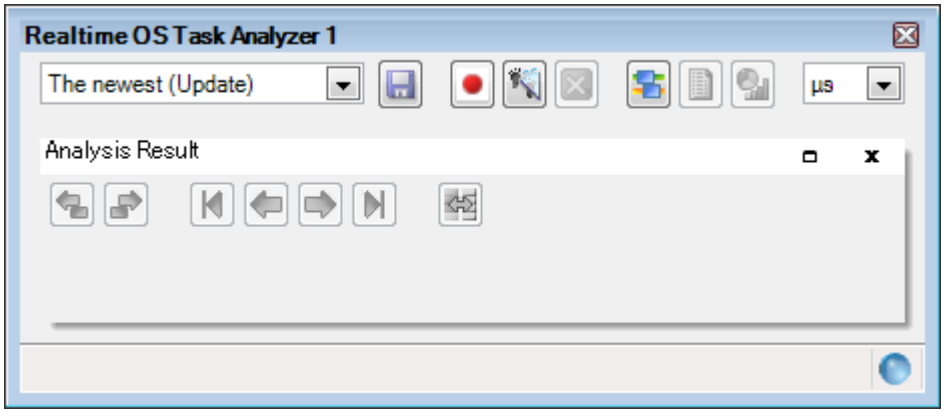
s	Displays in seconds
ms	Displays in milliseconds
us	Displays in microseconds

Remark 3. When the facility to change realtime OS resources is in use, the Realtime OS Task Analyzer cannot display the analysis information in some cases. For the facility to change realtime OS resources, see "RI850V4 Real-Time Operating System User's Manual: Debug".

2.2 Open Realtime OS Task Analyzer Panel

Open the Realtime OS Task Analyzer panel in order to view analysis information (the state of processing program execution, the state of real-time OS resource usage, the CPU usage status, etc.).
Up to two Realtime OS Task Analyzer panel can be opened by selecting [View] menu >> [Realtime OS] >> [Task Analyzer 1] and then selecting [View] menu >> [Realtime OS] >> [Task Analyzer 2].

Figure 2.1 Realtme OS Task Analyzer Panel



2.3 Set Trace Start Event

Set a trace start event that enables CS+ to acquire trace data when the execution of the load module is started.
A trace start event can be set by pressing the button which is located on the Toolbar on the Realtime OS Task Analyzer panel.

Table 2.1 Button Status

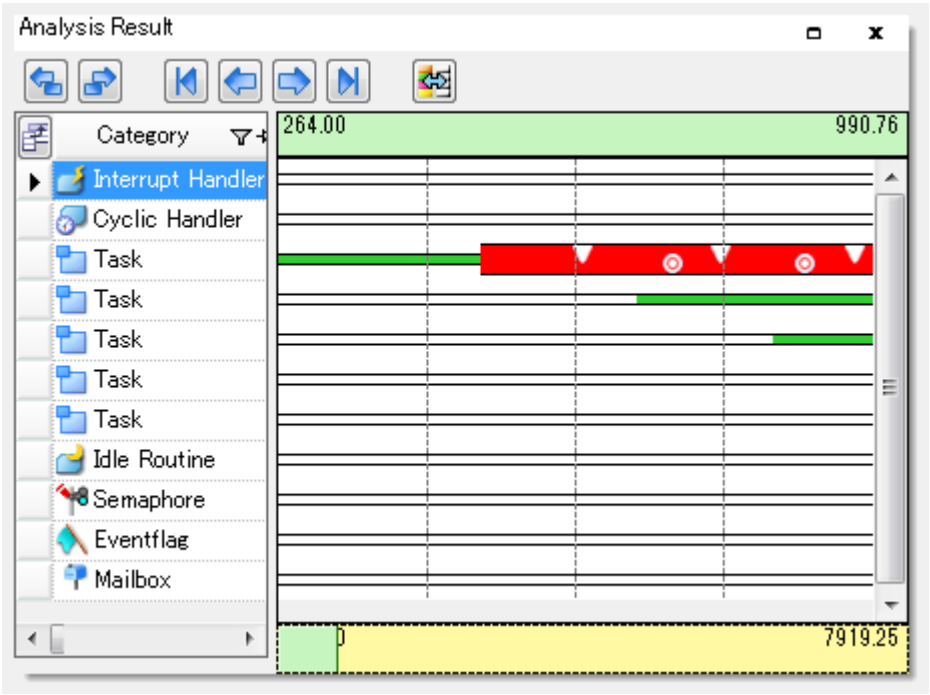
Button Status	Description
	Indicates that a trace start event is not set. When the button is in this condition, no trace data is acquired when the execution of the load module starts.
	Indicates that a trace start event is set. When the button is in this condition, trace data is acquired when the execution of the load module starts.

Remark Pressing the button changes the affected button to e ; pressing the button changes the affected button toe .

2.4 Open Analysis Result Panel

To view analysis information, such as the state of processing program execution, the state of real-time OS resource usage, and the CPU usage status, open the Analysis Result panel.
The Analysis Result panel can be opened by pressing the button which is located on the Toolbar on the Realtime OS Task Analyzer panel.

Figure 2.2 Analysis Result Panel



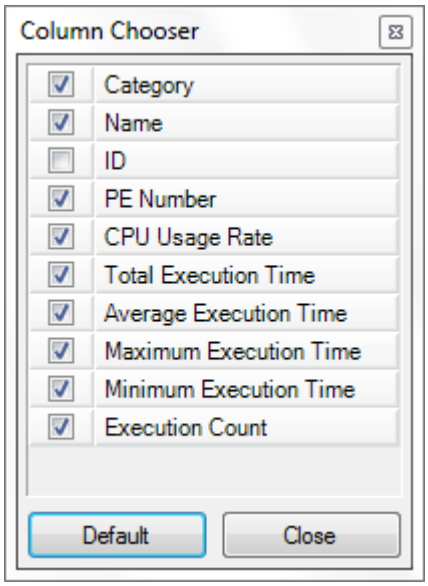
Remark The Analysis Result panel is displayed in the Child-panel display area on the Realtime OS Task Analyzer panel.

2.4.1 On/Off of item display

On the Analysis Result panel, using the button located in the upper left corner of the Analysis information table area, the user can select types of items to be displayed as a CPU usage status in the Analysis information table area.

To display or not to display a given item, use the Column Chooser dialog box that is opened by pressing the button located in the upper left corner of the Analysis information table area.

Figure 2.3 Column Chooser Dialog Box



Remark 1. Whether a given item is or is not to be displayed is specified by clicking on the applicable check box.

Checked	Displays the item in the Analysis information table area on the Analysis Result panel.
Not checked	Hides the item from the Analysis information table area on the Analysis Result panel.

Remark 2. Pressing the [Default] button in the Column Chooser dialog box resets the item types and their sorting order displayed in the Analysis information table area on the Analysis Result panel to their default condition.

2.4.2 Filtering of analysis information

On the Analysis Result panel, using the icon located in the column header in the Analysis information table area, the analysis information displayed in the Analysis information table area can be filtered.

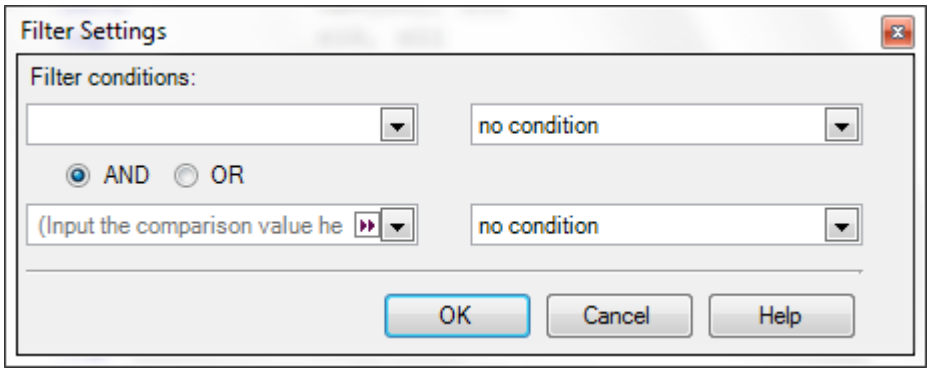
To filter analysis information, use the Filtering menu which is displayed by clicking on the icon located in the column header in the Analysis information table area.

Table 2.2 Filtering Menu

Filtering Menu	Description
(All)	Displays all analysis information.
(Custom)	Opens the Filter Settings dialog box that sets a filter condition on analysis information which is displayed as a CPU usage status.
(Blanks)	Only displays the lines indicated by "-".
(NonBlanks)	Displays lines other than those indicated by "-".
Object of display	Only displays the target object lines.

In the Filter Settings dialog box which is opened by selecting [(Custom)], the user can set detailed filter conditions.

Figure 2.4 Filter Settings Dialog Box



(1) Filtering using one filter condition
The filtering of analysis information can be performed by pressing the [OK] button after setting a filter condition in the 1st filter condition setting area in the Filter Settings dialog box.

Remark 1. When performing filtering using one filter condition, set the combo box in the 2nd filter condition setting area (left side) to "blanks", and the combo box (right side) to "no condition".

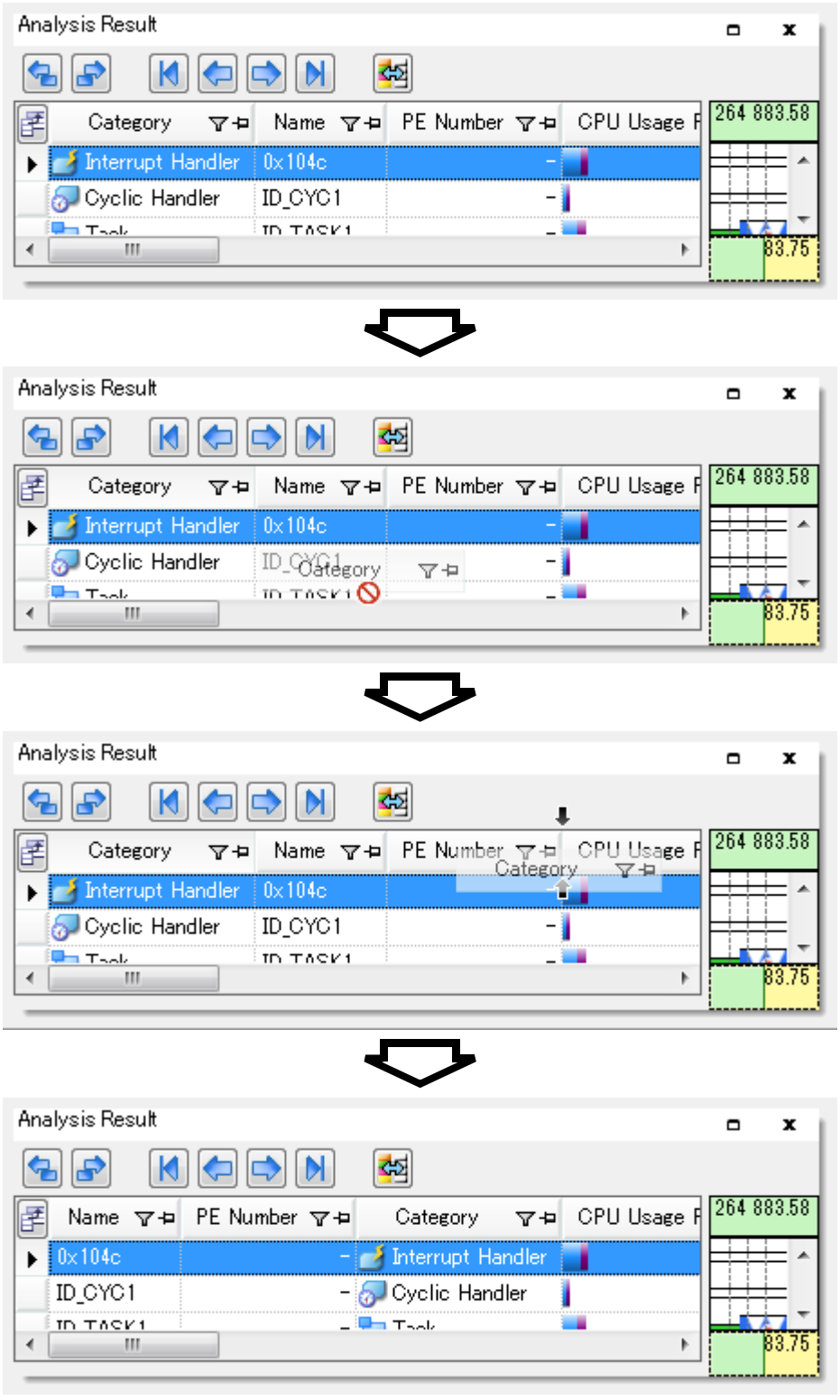
Remark 2. When filtering is to be performed using one filter condition, any settings in the Logic condition setting area are ignored.

(2) Filtering using two filter conditions
The filtering of analysis information can be performed by pressing the [OK] button after setting logic condition in the Logic condition setting area, and setting filter conditions in the 1st filter condition setting area and the 2nd filter condition setting area in the Filter Settings dialog box.

2.4.3 Change of sort order

On the Analysis Result panel, the sort order of items can be changed (columns can be moved) by dragging a column in the Analysis information table area and dropping it in the destination position.

Figure 2.5 Change of Sort Order

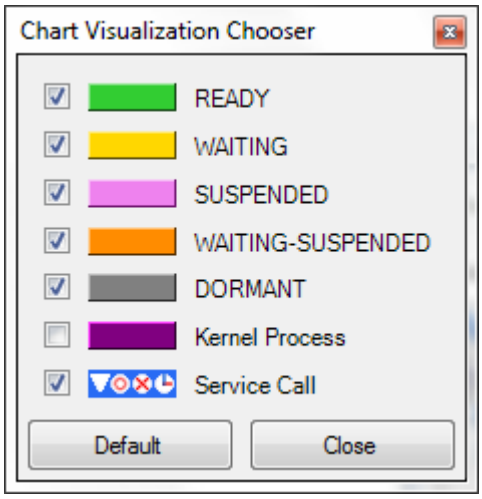


2.4.4 On/Off of display of state lines and event marks

On the Analysis Result panel, by pressing the button located on the Toolbar the user can select the type of state line to be displayed as an execution transition state for the processing program, and whether an event mark is or is not to be displayed as a real-time OS resource usage status, in the Analysis information diagram area.

Whether a state line and an event mark are or are not to be displayed can be specified in the Chart Visualization Chooser dialog box that is opened when the button located on the Toolbar is pressed.

Figure 2.6 Chart Visualization Chooser Dialog Box



Remark 1. Whether a state line and an event mark are or are not to be displayed can be specified by clicking on the applicable check box.

Checked	Displays the applicable state line or event mark in the Analysis information diagram area on the Analysis Result panel.
Not checked	Hides the applicable state line or event mark from the Analysis information diagram area on the Analysis Result panel.

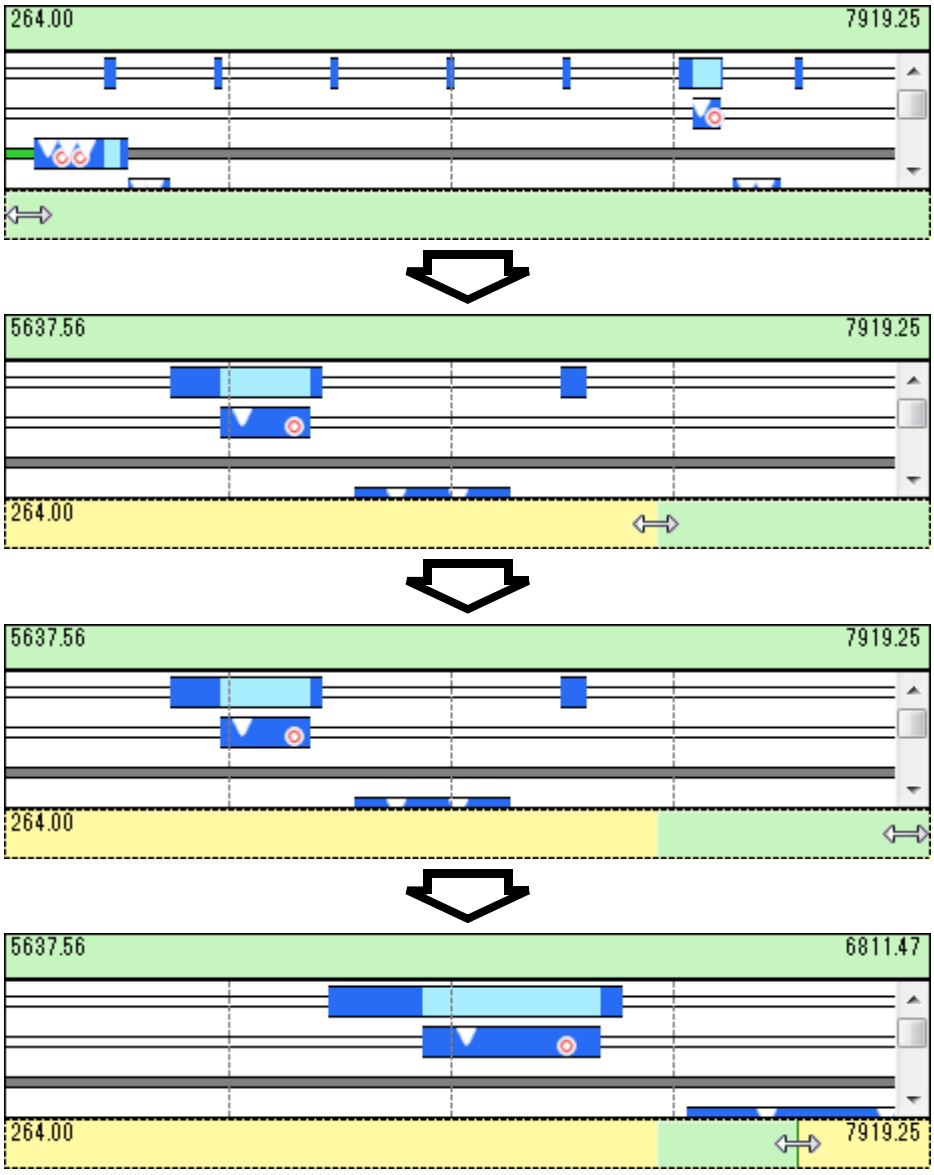
Remark 2. Pressing the [Default] button in the Chart Visualization Chooser dialog box resets the type of state line to be displayed and whether an event mark is or is not to be displayed in the Analysis information diagram area on the Analysis Result panel to its default condition.

2.4.5 Limiting range of execution transition state

On the Analysis Result panel, by using the Limiting bar, the user can limit the range of analysis information to be displayed as a processing program execution transition state or a real-time OS resource usage status, in the Execution transition state display area in the Analysis information diagram area.

It should be noted that the limiting the range of analysis information to be displayed in the Analysis information diagram area can be specified by dragging and dropping the left or right edge of the Limiting bar.

Figure 2.7 Limiting Range of Execution Transition State



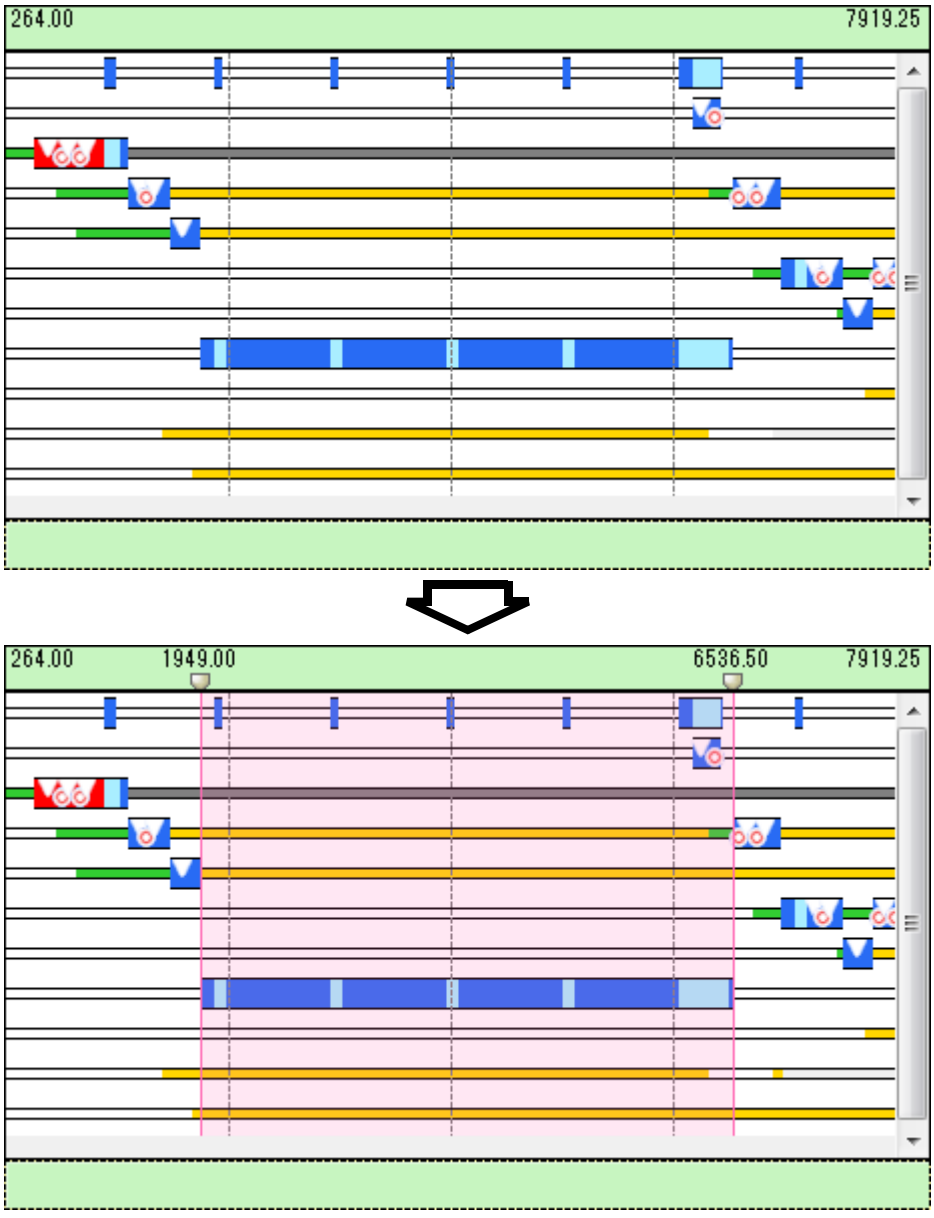
Remark By scrolling the Limiting bar, similar to the usual scrollbar, the user can change the interval at which information is displayed in the Analysis information diagram area.

2.4.6 Limiting range of usage status

On the Analysis Result panel, by dragging and dropping with the mouse cursor in the Execution transition state display area in the Analysis information diagram area, the user can change the analysis information to be displayed in the Analysis information table area from "analysis information in the trace data acquisition period" to "analysis information in the analysis information extraction interval".

It should be noted that the background for the Analysis information extraction interval that appears when the mouse cursor is dragged and dropped in the Execution transition state display area assumes the magenta color.

Figure 2.8 Limiting Range of Usage Status

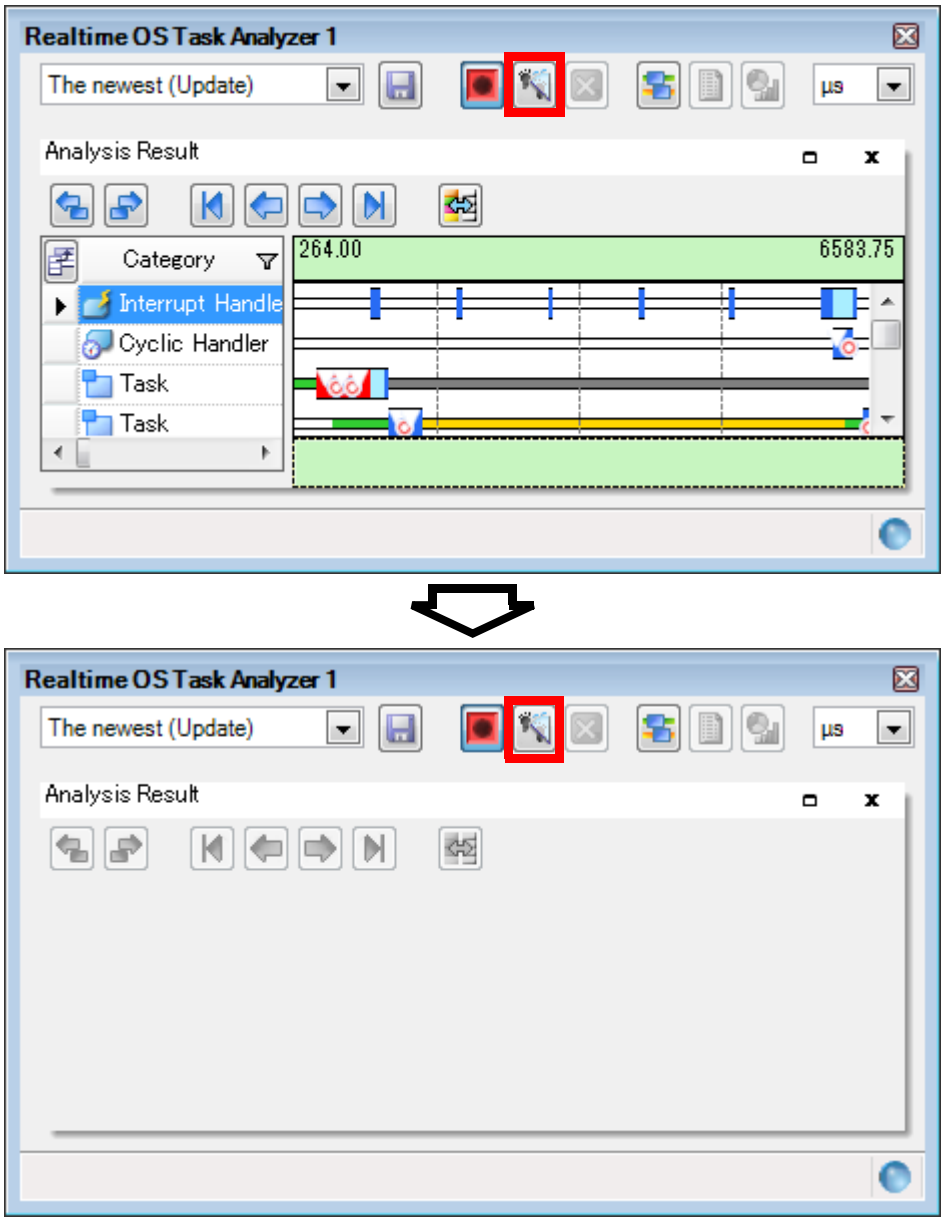


Remark By scrolling the marks that are displayed directly below the Start time of analysis information extraction/End time of analysis information extraction, similar to the regular scrollbar, the user can change the Analysis information extraction interval.

2.5 Clear Analysis Information

By pressing the button located on the Toolbar on the Realtime OS Task Analyzer panel, the user can clear the analysis information that is displayed in the Child-panel display area.

Figure 2.9 Clear Analysis Information



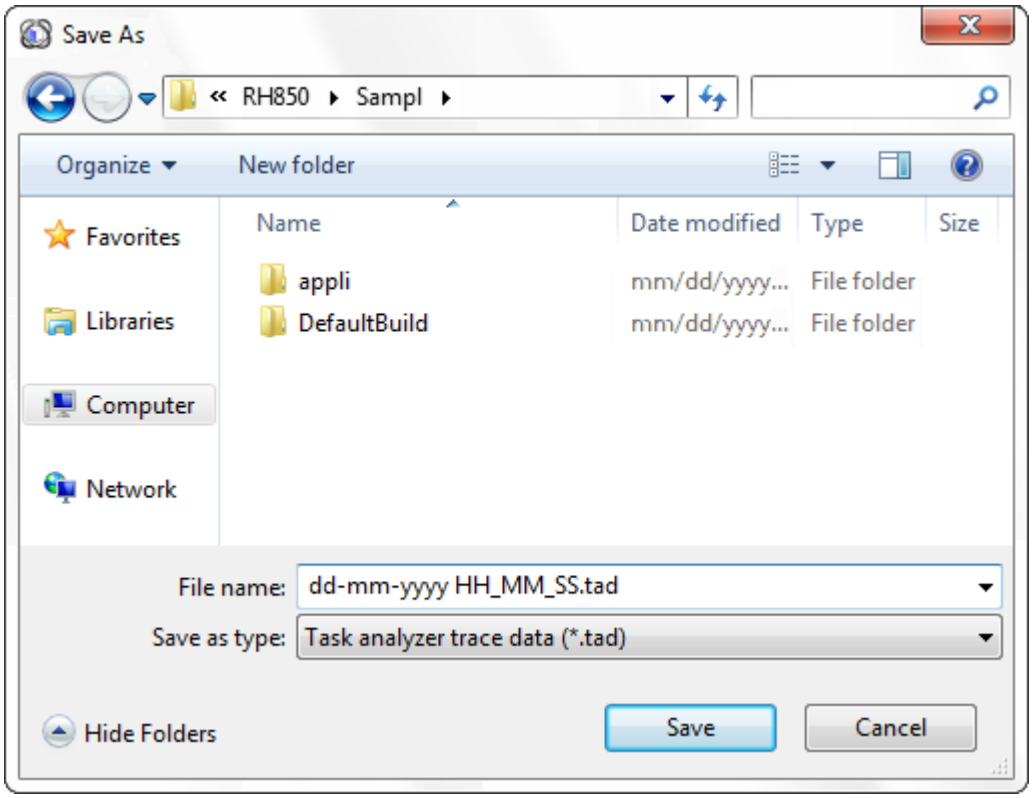
Remark Pressing the button also clears the contents of the trace buffer.

2.6 Save Analysis Information

By pressing the button located on the Toolbar on the Realtime OS Task Analyzer panel, the user can save the analysis information as task analyzer trace data.

Where the task analyzer trace data is to be saved and the file name by which it is to be saved can be selected/specified on the Save As dialog box which is opened when the button is pressed.

Figure 2.10 Save As Dialog Box

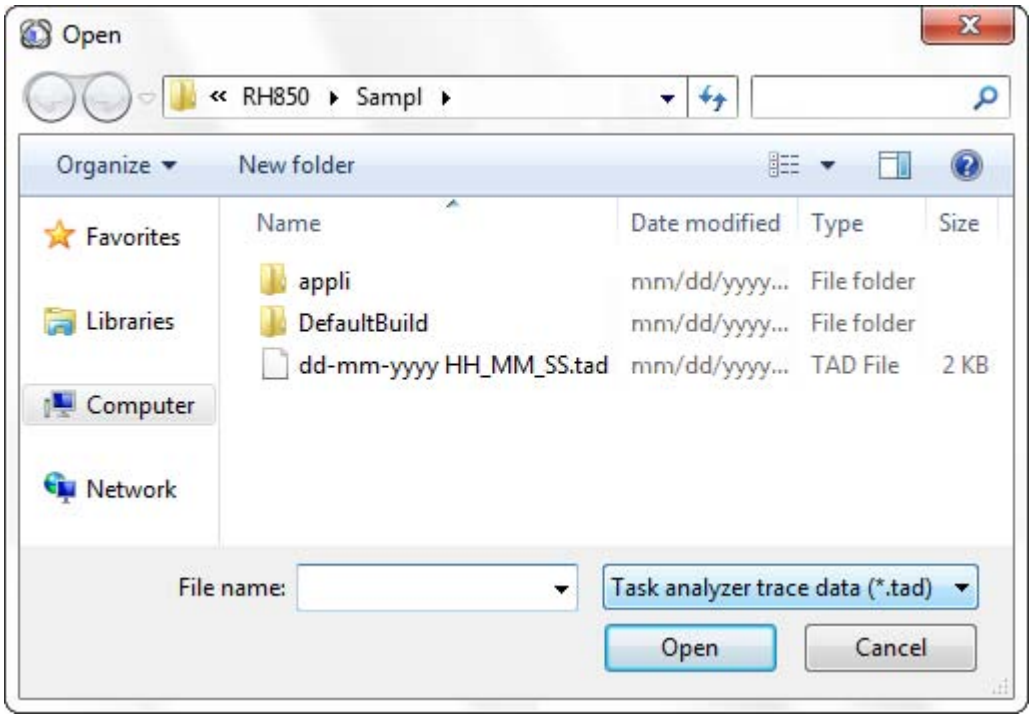


2.7 Restore Analysis Information

With regard to the analysis information that was saved by pressing the button located on the Toolbar on the Real-time OS Task Analyzer panel, the user can restore it to the Child-panel display area on the Realtime OS Task Analyzer panel by selecting either [Open trace data...] or [*Task analyzer trace data name*] from the drop-down list located on the Toolbar on the Realtime OS Task Analyzer panel.

When selecting the [Open trace data....] on the drop-down list, select/specify the folder and the file in which the task analyzer trace data is stored, in the Open dialog box which is opened when the menu is selected.

Figure 2.11 Open Dialog Box



A. WINDOW REFERENCE

This appendix describes the panels and dialog boxes of the task analyzer tool.

A.1 Description

Shows a list of panels and dialog boxes of the task analyzer tool below:

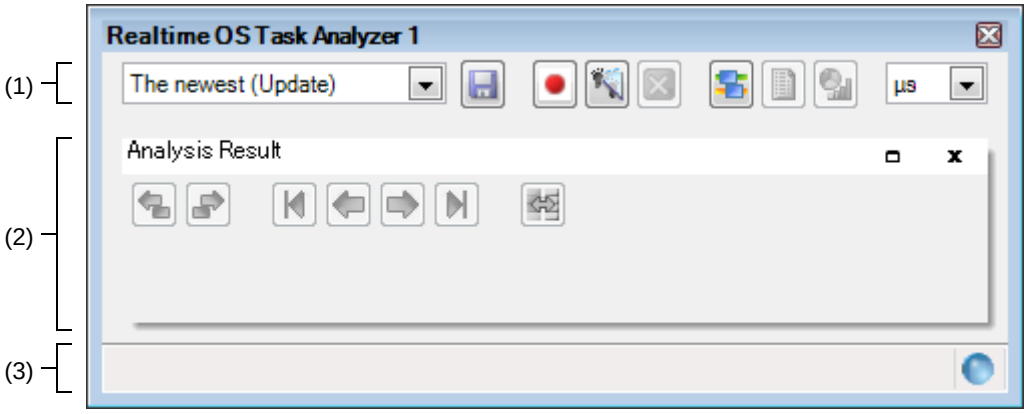
Table A.1 Panel/Dialog Box List

Panel/Dialog Box List	Description
Realtime OS Task Analyzer panel	Displays analysis information such as execution transition state of the processing program, the state of real-time OS resource usage, and CPU usage status. The Analysis Result panel is displayed in the Child-panel display area on this panel.
Analysis Result panel	A child-panel of the Realtime OS Task Analyzer panel. This panel displays analysis information such as execution transition state of the processing program, the state of real-time OS resource usage, and CPU usage status.
Column Chooser dialog box	Specifies the type of the item to be displayed as a CPU usage status in the Analysis information table area on the Analysis Result panel.
Filter Settings dialog box	Sets filter conditions on the analysis information which is displayed as a CPU usage status in the Analysis information table area on the Analysis Result panel.
Chart Visualization Chooser dialog box	Specifies the type of state line to be displayed as an execution transition state of the processing program, and whether an event mark is or is not to be displayed as a real-time OS resource usage status, in the Analysis information diagram area on the Analysis Result panel.
Open dialog box	Reads the analysis information that has been saved as the task analyzer trace data to display the information in the Child-panel display area on the Realtime OS Task Analyzer panel.
Save As dialog box	Saves the analysis information that has been displayed in the Child-panel display area on the Realtime OS Task Analyzer panel as the task analyzer trace data.

Realtime OS Task Analyzer panel

This panel displays the analysis information such as the execution transition state of the processing program, the state of real-time OS resource usage, and CPU usage status.

Figure A.1 Realtime OS Task Analyzer Panel



The following items are explained here.

- [How to open]
- [Description of each area]

[How to open]

- From the [View] menu, select [Realtime OS] >> [Task Analyzer *1* - *2*].

[Description of each area]

(1) Toolbar
This area consists of the following drop-down lists and buttons.

The newest (Update)	When the execution of the load module is stopped, specifies whether or not to update the analysis information displayed in the Child-panel display area, or selects the task analyzer trace data which holds the analysis information to be displayed in the Child-panel display area.	
	The newest (Update)	Updates the analysis information in the Child-panel display area when the execution of the load module stops or when this item is selected.
	Not update	Does not update the analysis information in the Child-panel display area when the execution of the load module stops.
	Opens trace data...	Reads the analysis information saved as task analyzer trace data to open the Open dialog box which displays the information in the Child-panel display area.
	Task analyzer trace data name	Displays the analysis information which has been held in the given file on the Child-panel display area.
	Opens the Save As dialog box to save the analysis information displayed in the Child-panel display area as task analyzer trace data.	

/	Selects whether or not to acquire trace data when the execution of the load module is started.	
		Indicates that a trace start event has not been set. When the button is in this condition, trace data is not acquired when the execution of the load module is started.
		Indicates that a trace start event has been set. When the button is in this condition, trace data is acquired when the execution of the load module is started.
	Clears the analysis information displayed in the Child-panel display area. When this button is pressed, the content of the trace buffer is also cleared.	
	Always invalid for this version.	
	Displays the Analysis Result panel in the Child-panel display area.	
	Always invalid for this version.	
	Always invalid for this version.	
s	Selects units of time when the time-related analysis information (Total Execution Time, Average Execution Time, etc.) is displayed in the Child-panel display area.	
	s	by the second
	ms	by the millisecond
	us	by the microsecond

(2) Child-panel display area
This area consists of the following child-panel.

- Analysis Result panel

Remark For details on this area, see section "Analysis Result panel".

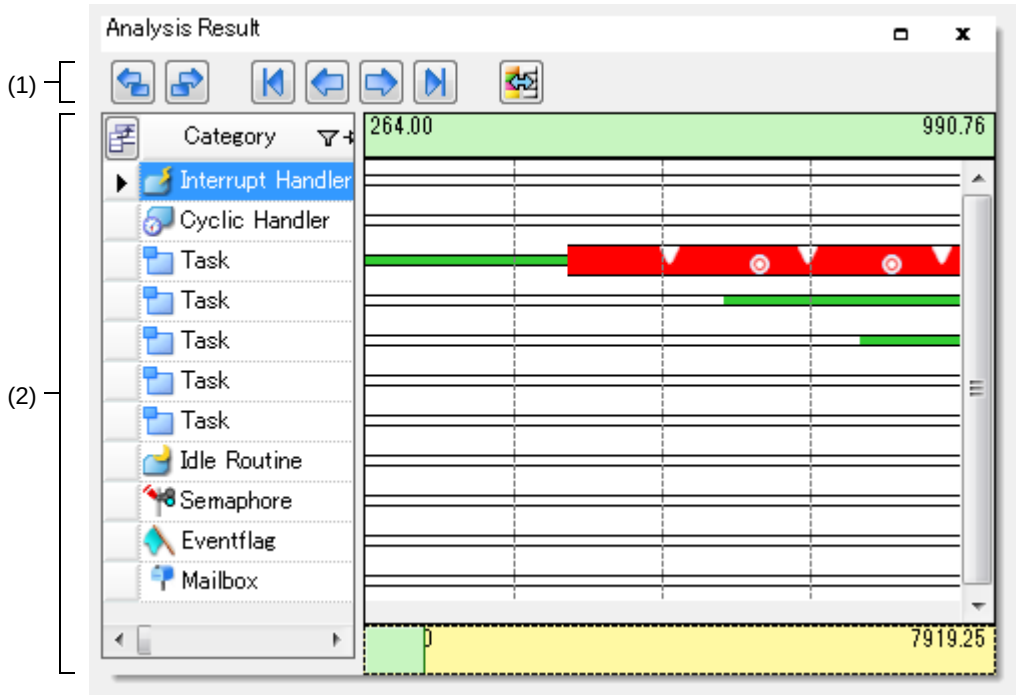
(3) Status bar
This area consists of the following bars and marks.

33%	Indicates processing progress for this panel. The item in progress is displayed on the left side of the status bar.	
/	Indicates whether or not the task analyzer tool is or is not in a condition that allows to analyze the execution transition state of the processing program, the state of real-time OS resources usage, the CPU usage status, etc.	
		Indicates that the task analyzer tool is in a condition that allows various analyses to be performed.
		Indicates that the task analyzer tool is in a condition that does not allow various analyses to be performed due to the tool tip that is displayed when the mouse cursor is placed on this mark.

Analysis Result panel

This panel is a Child-panel display area of the Realtime OS Task Analyzer panel to display the analysis information such as execution transition state of the processing program, the state of real-time OS resource usage, and the CPU usage status.

Figure A.2 Analysis Result Panel



The following items are explained here.

- [How to open]
- [Description of each area]
- [Context menu]

[How to open]

- Press the button located on the Toolbar on the Realtime OS Task Analyzer panel.

[Description of each area]

(1) Toolbar
This area consists of the following buttons.

	In the Analysis information diagram area, changes the red-highlighted processing interval from "the processing interval now being highlighted in red" to "the processing interval which was executed prior to the highlighted processing interval".
	In the Analysis information diagram area, changes the red-highlighted processing interval from "the interval now being highlighted in red" to "the interval which was executed immediately after the highlighted processing interval".
	In the Analysis information diagram area, changes the red-highlighted processing interval from "the interval now being highlighted in red" to "the interval at which the given processing program was executed first". Note that the "first executed" processing interval is the interval at which the given processing program was executed first during trace data acquisition.

	In the Analysis information diagram area, changes the red-highlighted processing interval from "the interval now being highlighted in red" to "the interval just before which the given processing program was executed".
	In the Analysis information diagram area, changes the red-highlighted processing interval from "the interval now being highlighted in red" to "the interval immediately after which the given processing program was executed".
	In the Analysis information diagram area, changes the red-highlighted processing interval from "the interval now being highlighted in red" to "the interval at which the given processing program was executed last". Note that the "last executed processing interval" is the interval at which the processing program was executed last during trace data acquisition.
	Opens the Chart Visualization Chooser dialog box to specify the type of state line to be displayed as an execution transition state of the processing program, and whether an event mark is or is not displayed as real-time OS resources usage status, in the Analysis information diagram area.

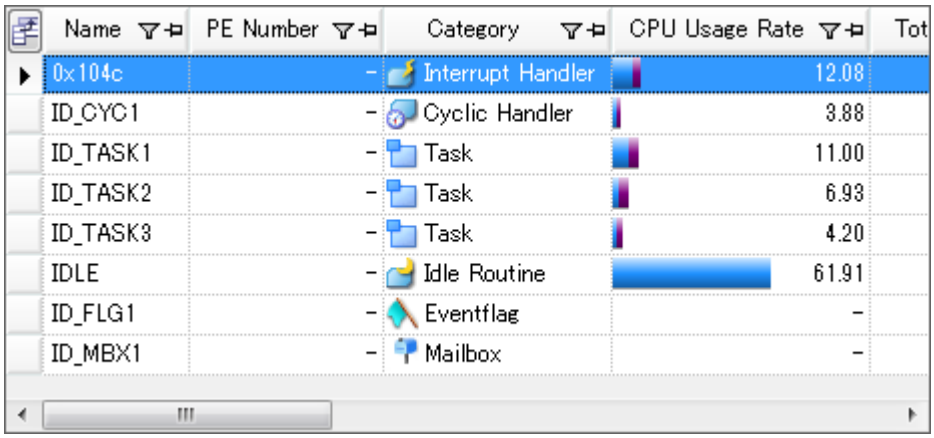
(2) Analysis information display area

Displays analysis information including the execution transition state of the processing program, the state of real-time OS resource usage, and the CPU usage status, among the acquired trace data.

(a) Analysis information table area

Displays the analysis information about the CPU usage status in table form.

Figure A.3 Analysis Information Table Area



The following table shows the elements which make up this area.

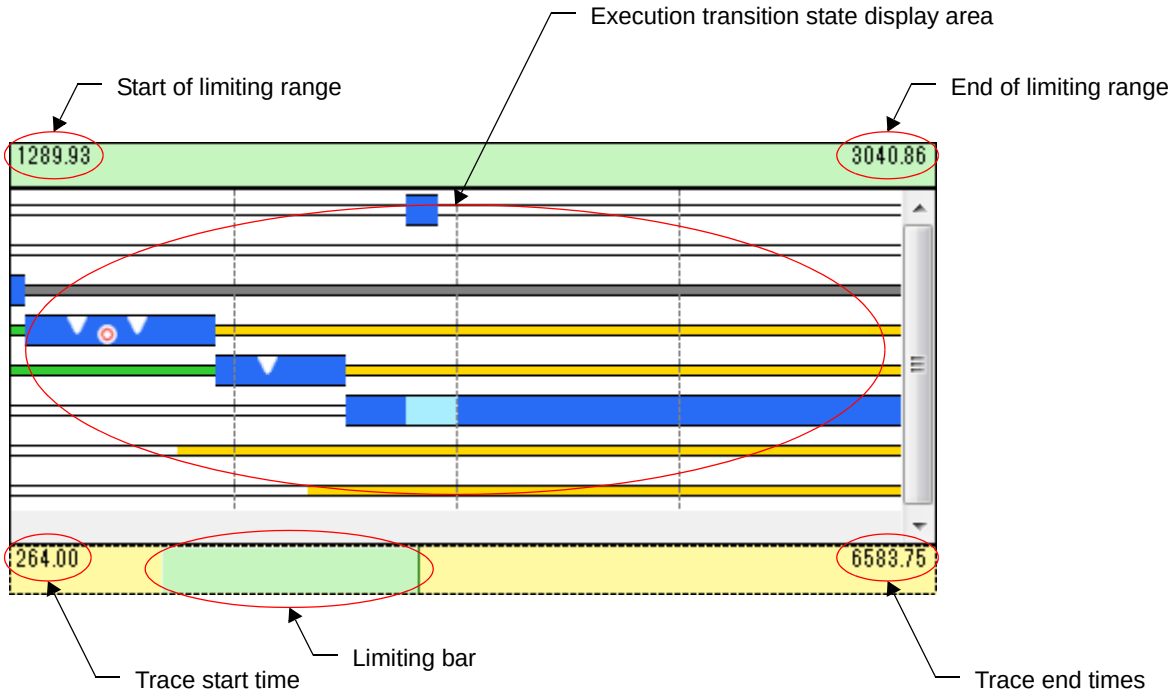
The analysis information displayed in this area is the CPU usage status during trace data acquisition or during the Analysis information extraction interval during which data is extracted by mouse cursor drag & drop in the Execution transition state display area in the Analysis information diagram area.

	Opens the Column Chooser dialog box to specify the types of items to be displayed as the CPU usage status in the Analysis information table area.	
/	Displays the sort order in the target column.	
		Indicates the sort in ascending order.
		Indicates the sort in descending order.

/	Displays whether a filter condition is or is not set for the target column.		
	Indicates that a filter condition is not set for the column. Clicking on this icon displays the following filtering menu.		
		(All)	Displays all analysis information.
		(Custom)	Opens the Filter Settings dialog box to set a filter condition on analysis information which is displayed as CPU usage status.
		(Blanks)	Only displays the lines indicated by "-".
		(NonBlanks)	Displays lines other than those indicated by "-".
		Object of display	Only displays the target object lines.
	Indicates a column for which a filter condition has been set.		
/	Indicates whether the target column is or is not the scroll target during horizontal scrolling using the scrollbar.		
	Indicates that the column is the scroll target.		
	Indicates that the column is not the scroll target.		
Category	Displays the type of the objects (processing program or real-time OS resource). Note that the processing programs displayed in this column are limited to the ones which were executed during trace data acquisition, and the real-time OS resource displayed in the column is limited to the one whose task was queued in the task wait queue of the object during trace data acquisition.		
Name	Displays the ID name of the object.		
ID	Displays the ID number of the object.		
PE Number	Always displays "-".		
CPU Usage Rate	Displays the execution ratio (total ratio or user/kernel ratio) for the processing program. The [Context menu] menu is used to switch between "total ratio" and "user/kernel ratio".		
Total Execution Time	Displays the total execution time of the processing program.		
Average Execution Time	Displays the average continuous execution time of the processing program.		
Maximum Execution Time	Displays the maximum continuous execution time of the processing program.		
Minimum Execution Time	Displays the minimum continuous execution time of the processing program.		
Execution Count	Displays the execution count (number of times of execution from the start) of the processing program.		

(b) Analysis information diagram area
Displays analysis information about the execution transition state of the processing program and realtime OS resource usage status in diagram form.

Figure A.4 Analysis Information Diagram Area



The elements which make up this area are as follows.

<1> Start of limiting range
Displays the "time when trace data acquisition has been started" during the trace data acquisition period which is specified with the Limiting bar.

<2> End of limiting range
Displays the "time when trace data acquisition has been finished" during the trace data acquisition period which is specified with the Limiting bar.

<3> Execution transition state display area
Displays the execution transition state of the processing program and realtime OS resource usage status for the trace data acquisition period specified with the Limiting bar.
In this area, execution transition state of the processing program is indicated as follows:

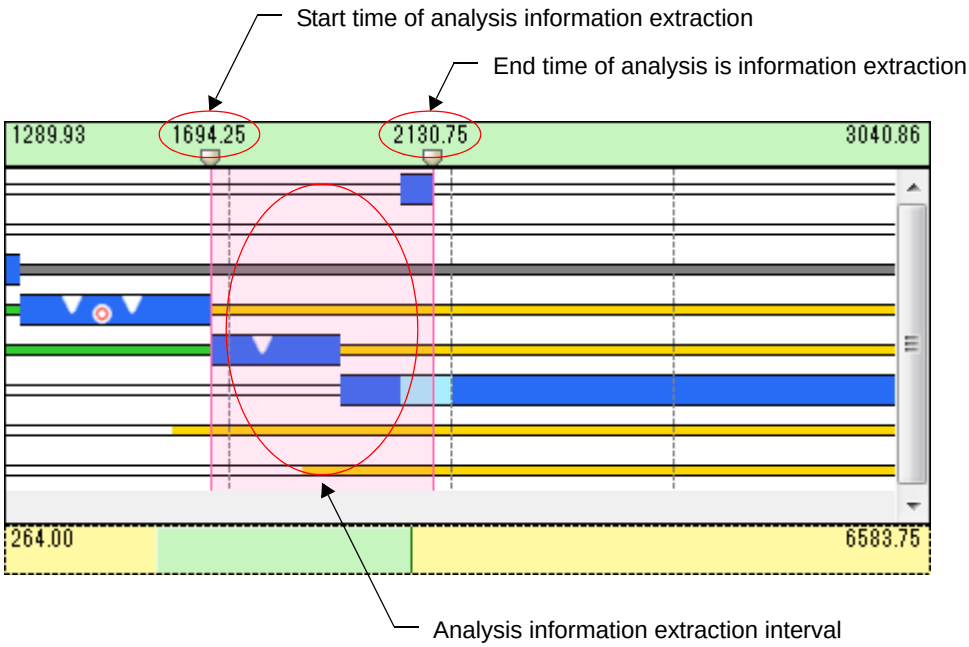
	Indicates that a processing program was executed.
	Indicates that a processing program has been suspended.
	Indicates that a task is in transition to the READY state.
	Indicates that a task is in transition to the WAITING state, or a task has been queued in the wait queue of the real-time OS resource.
	Indicates that a task is in transition to the SUSPENDED state.
	Indicates that a task is in transition to the WAITING-SUSPENDED state.
	Indicates that a task is in transition to the DORMANT state.
	Indicates that RI850V4 processing was executed in association with the issued service call.
	When "processing program" has been selected in the Analysis information table area, this color indicates the processing interval that was executed first among the intervals shown by . Pressing the Toolbar buttons (, , etc) moves to the corresponding processing interval.

In this area, usage status of the real-time OS resource is indicated with the event marks below:

	Indicates that a service call has been issued. When the mouse cursor is placed on this mark, the "service call name" (ID number of the object) for which a service call is issued.
	Indicates that a service call has been terminated normally. When the mouse cursor is placed on this mark, "E_OK (0)" appears indicating normal termination of the service call.
	Indicates that a service call has been terminated abnormally. When the mouse cursor is placed on this mark, "macro name (value)" appears indicating abnormal termination of the service call.
	Indicates that a service call has been timed out. When the mouse cursor is placed on this mark, "E_TMOUT (-50)" appears indicating timeout of the service call.

Remark By dragging and dropping the mouse cursor in this area, the analysis information to be displayed in the Analysis information table area can be updated from "analysis information during the trace data acquisition period" to "analysis information during the analysis information extraction interval".
To cancel "analysis information during the analysis information extraction interval," move the mouse cursor to within the Analysis information diagram area, and then double click on the left mouse button while pressing the [Ctrl] key.
For details on this operation, see section "2.4.6 Limiting range of usage status".

Figure A.5 Extraction of Analysis Information



Elements which make up the analysis information extraction interval are as follows:

<a> Start time of analysis information extraction
Displays the "time when trace data acquisition has been started" during the Analysis information extraction interval.
The Analysis information extraction interval can be changed by scrolling the mark right under the extraction start time, in the same way as with the usual scrollbar.

<b> End time of analysis information extraction
Displays the "time when trace data acquisition has been finished" during the Analysis information extraction interval.
The Analysis information extraction interval can be changed by scrolling the mark right under the extraction end time, in the same way as with the usual scrollbar.

<c> Analysis information extraction interval

Displays the execution transition state of the processing program and the real-time OS resource usage status during the Analysis information extraction interval.
The Analysis information extraction interval appears in magenta background.

<4> Trace start time
Displays the time when trace data acquisition has been started.

<5> Trace end time
Displays the time when trace data acquisition has been finished.

<6> Limiting bar
Specifies the interval at which information is displayed in the Analysis information diagram area during the trace data acquisition period.
Dragging and dropping the left edge of this bar allows the start time of the limiting range to be changed, and dragging and dropping the right edge allows the end time of the limiting range to be changed.
In addition, by scrolling this bar, the interval at which information is displayed in the Analysis information diagram area can be changed in the same way as with the usual scrollbar.

Remark By using the mouse wheel with the [Ctrl] key pressed, the display within the Analysis information diagram area can be scaled.

[Context menu]

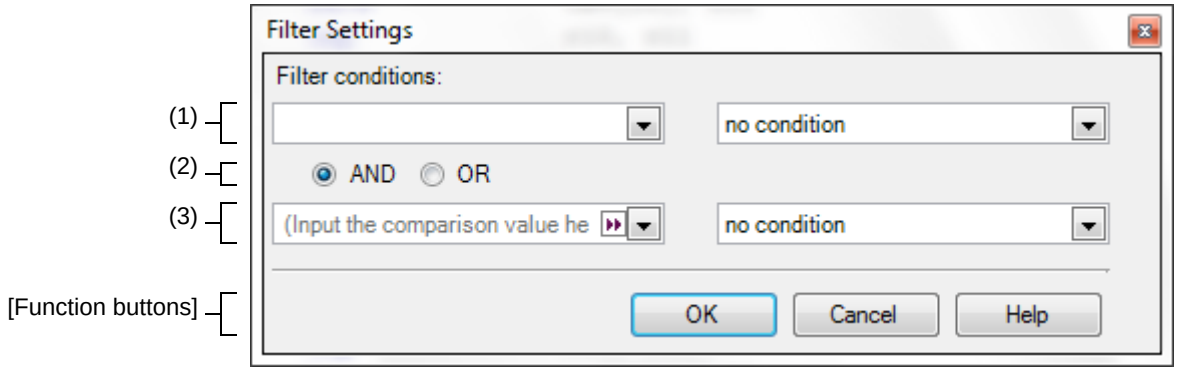
By right-clicking on the mouse, the following context menu is displayed:

Display Total Ratio	Switches the ratio in the CPU Usage Rate column to Total Ratio. When this menu has been selected, "the ratio of the total execution time of the processing program to the total execution time of all the processing programs" is displayed in the CPU Usage Rate column.
Display User/Kernel Ratio	Switches the ratio in the CPU Usage Rate column to User/Kernel Ratio. When this menu has been selected, "the ratio of the total execution time of the processing program to the total execution time of all the processing programs" is displayed in the CPU Usage Rate column in the following form: *xxx* / *yyy* - *xxx* The ratio of the total execution time of the given processing program (excluding RI850V4 processing time associated with service call issuance) to the total execution time of all the processing programs. - *yyy* The ratio of the RI850V4 total processing time associated with service call issuance in the given processing program to the total execution time of all the processing programs.
Jump to Source	Opens the Editor panel and displays the source of the processing program.
Jump to Disassemble	Opens the Disassemble panel and displays the disassemble results of the processing program.
Go to Maximum Execution Time	Highlights in red the portion representing the maximum continuous execution time of the processing program in the Analysis information diagram area.
Go to Minimum Execution Time	Highlights in red the portion representing the minimum continuous execution time of the processing program in the Analysis information diagram area.

Filter Settings dialog box

This dialog box sets filter conditions on analysis information which is displayed as the CPU usage status, in the Analysis information table area on the Analysis Result panel.

Figure A.6 Filter Settings Dialog Box



The following items are explained here.

- [How to open]
- [Description of each area]
- [Function buttons]

[How to open]

- Click on icon in the column header in the Analysis information table area on the Analysis Result panel. From the displayed menu, select [(Custom)].

[Description of each area]

(1) 1st filter condition setting area
This area consists of the following two combo boxes.

(a) Combo box (left side)
Sets the comparison value (numerical value or character string) for filtering.
Up to 2048 characters can be input to this combo box.

(b) Combo box (right side)
Selects a filter condition for the comparison value which is set in the Combo box (left side).

Filter Condition	Comparison Value (Numerical)	Comparison Value (Character String)
no condition	Comparison based on numerical values	Comparison based on character strings
equals		
does not equals		
is greater than		
is greater than or equal to		
is less than		
is less than or equal to		

Filter Condition	Comparison Value (Numerical)	Comparison Value (Character String)
begins with	Comparison based on character strings	Comparison based on character strings
does not begin with		
ends with		
does not end with		
contains		
does not contain		

(2) Logic condition setting area
This area consists of the following two buttons.

(a) [AND] button
Sets the logic condition that "both filter conditions set in the 1st filter condition setting area and 2nd filter condition setting area are satisfied".

(b) [OR] button
Sets the logic condition that "either of the filter conditions set in the 1st filter condition setting area and 2nd filter condition setting area is satisfied".

(3) 2nd filter condition setting area
This area consists of the following two combo boxes.

(a) Combo box (left side)
Sets the comparison value (numerical value or character string) for filtering.
Up to 2048 characters can be input to this combo box.

(b) Combo box (right side)
Selects a filter condition for the comparison value set in the Combo box (left side).

Filter Condition	Comparison Value (Numerical)	Comparison Value (Character String)
no condition	Comparison based on numerical values	Comparison based on character strings
equals		
does not equals		
is greater than		
is greater than or equal to		
is less than		
is less than or equal to		
begins with	Comparison based on character strings	Comparison based on character strings
does not begin with		
ends with		
does not end with		
contains		
does not contain		

[Function buttons]

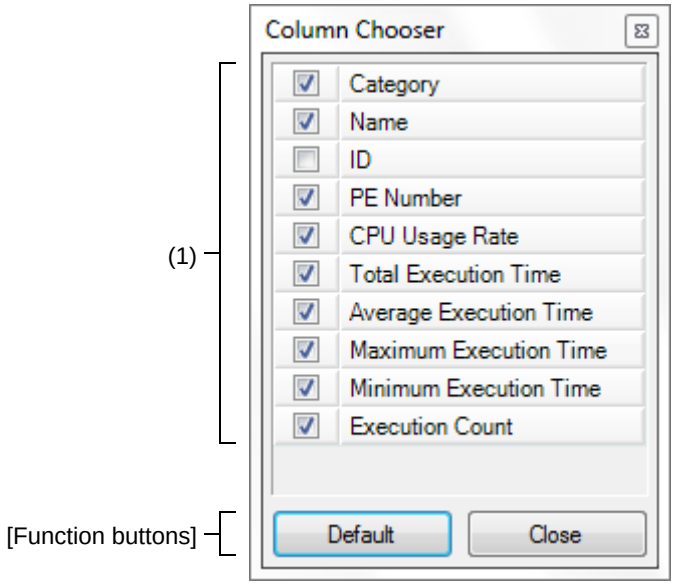
OK	Filters the analysis information to be displayed in the Analysis information table area on the Analysis Result panel, according to the filter condition set in this dialog box.

Cancel	Closes this dialog box.
Help	Displays Help for this dialog box.

Column Chooser dialog box

This dialog box sets the type of the items to be displayed as the CPU usage status in the Analysis information table area on the Analysis Result panel.

Figure A.7 Column Chooser Dialog Box



The following items are explained here.

- [How to open]
- [Description of each area]
- [Function buttons]

[How to open]

- Press the button located in the upper left corner of the Analysis information table area on the Analysis Result panel.

[Description of each area]

(1) Item select area
Selects whether or not to display the applicable items in the Analysis information table area on the Analysis Result panel.

Checked	Displays the applicable items in the Analysis information table area on the Analysis Result panel.
Not checked	Hides the applicable items from the Analysis information table area on the Analysis Result panel.

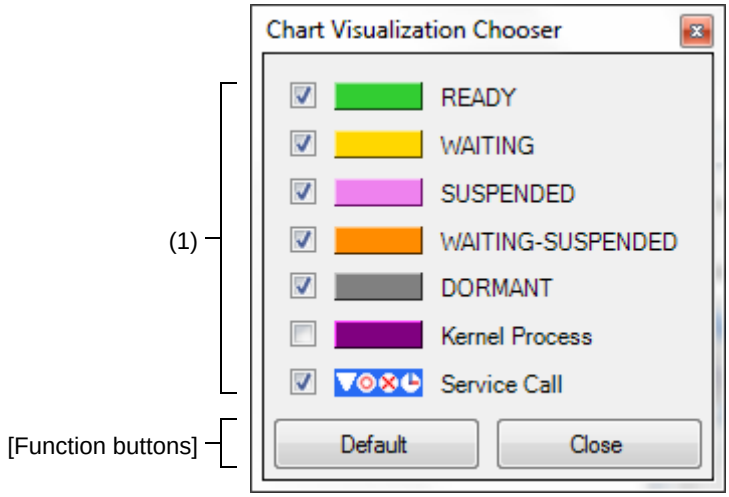
[Function buttons]

Default	Resets the item types and their sorting order displayed in the Analysis information table area on the Analysis Result panel to their default condition.
Close	Closes this dialog box.

Chart Visualization Chooser dialog box

This dialog box specifies the type of state line to be displayed as an execution transition of the processing program, and whether an event mark is or is not to be displayed as a realtime OS resource usage status, in the Analysis information diagram area on the Analysis Result panel.

Figure A.8 **Chart Visualization Chooser Dialog Box**



The following items are explained here.

- [How to open]
- [Description of each area]
- [Function buttons]

[How to open]

- Press the button located on the Toolbar on the Analysis Result panel.

[Description of each area]

(1) State line select area
Selects whether or not to display the applicable state line or event mark in the Analysis information diagram area on the Analysis Result panel.

Checked	Displays the applicable state line or event mark in the Analysis information diagram area on the Analysis Result panel.
Not checked	Hides the applicable state line or event mark from the Analysis information diagram area on the Analysis Result panel.

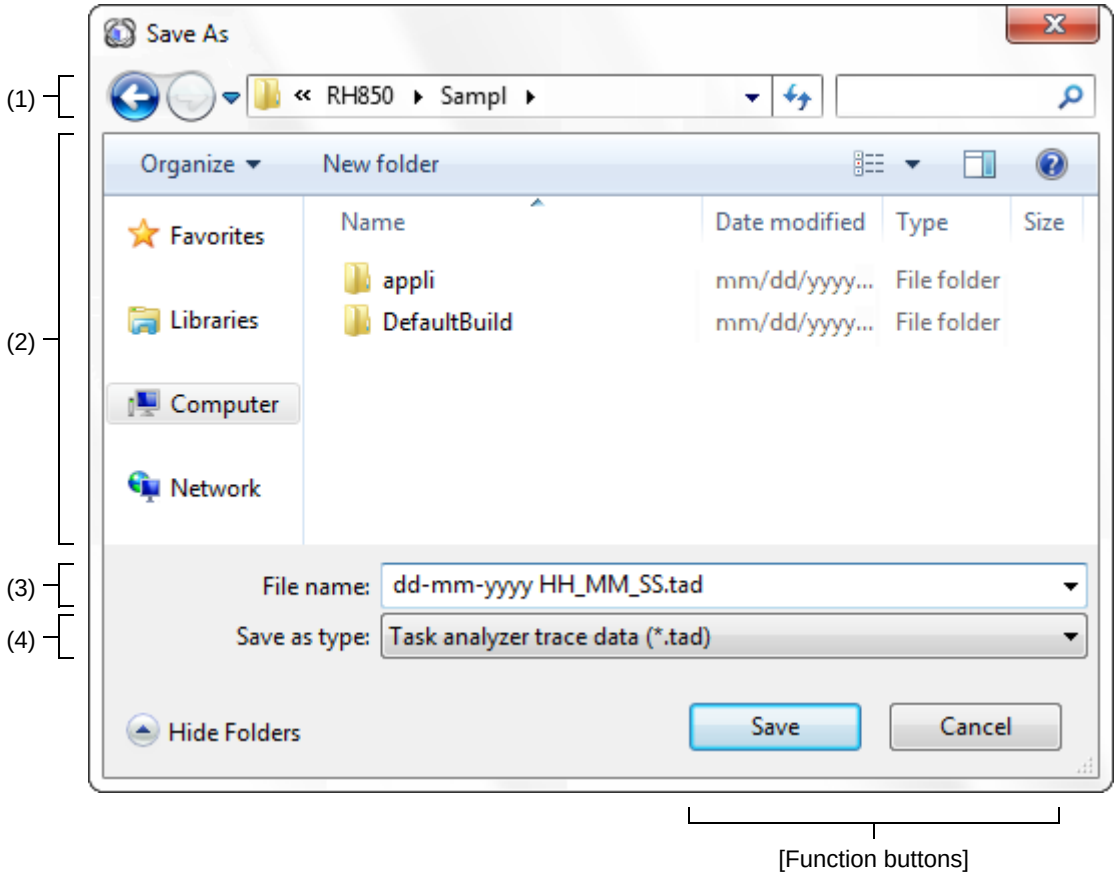
[Function buttons]

Default	Resets the type of state line to be displayed and whether an event mark is or is not to be displayed in the Analysis information diagram area on the Analysis Result panel to its default condition.
Close	Closes this dialog box.

Save As dialog box

This dialog box saves the analysis information in the Child-panel display area on the Realtime OS Task Analyzer panel as task analyzer trace data.

Figure A.9 Save As Dialog Box



The following items are explained here.

- [How to open]
- [Description of each area]
- [Function buttons]

[How to open]

- Press the button located on the Toolbar on the Realtime OS Task Analyzer panel.

[Description of each area]

(1) Folder location
This is for selection of the output destination folder (folder name).

(2) List of files
Lists the files from the folder selected in Folder location which meet the condition selected in [Save as type].

(3) [File name]
Specifies the name of the file where you want to store the task analyzer trace data.

(4) [Save as type]
Selects "Task analyzer trace data (*.tad)" as the type of files to be saved.

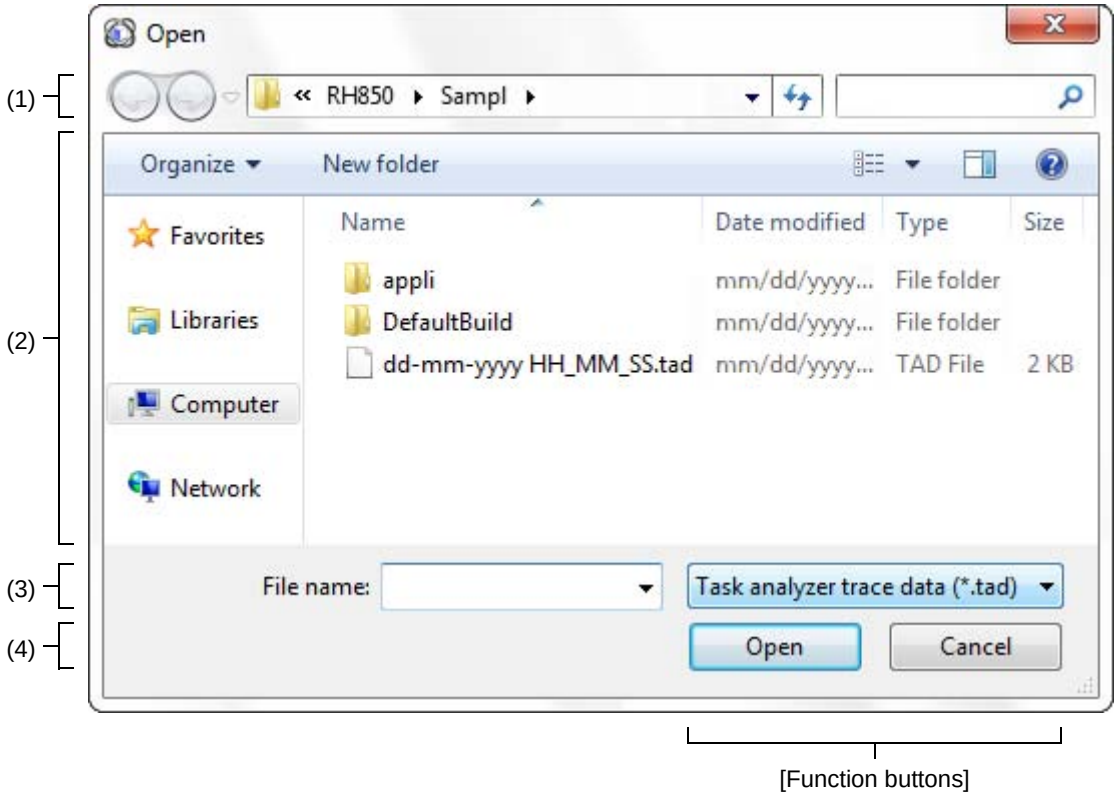
[Function buttons]

Save	Saves the task analyzer trace data in the file specified in [File name] and [Save as type] in the folder specified in Folder location.
Cancel	Ignores the setting and closes this dialog box.

Open dialog box

This dialog box reads the analysis information saved as task analyzer trace data and displays the information in the Child-panel display area on the Realtime OS Task Analyzer panel.

Figure A.10 Open Dialog Box



The following items are explained here.

- [How to open]
- [Description of each area]
- [Function buttons]

[How to open]

- Select [Opens trace data...] from the menu list located on the Toolbar on the Realtime OS Task Analyzer panel.

[Description of each area]

(1) [Look in]
Selects a folder containing the task analyzer trace data.

(2) List of files
Lists the files that meet the conditions selected in [Look in] and [Files of type].

(3) [File name]
Specifies the name of the file containing the task analyzer trace data to be read.

(4) [Files of type]
Selects "Task analyzer trace data (*.tad)" as the type of the file to be read.

[Function buttons]

Open	From the folder specified in [Look in], read the file specified in [File name] and [Files of type] to display the applicable information on the Analysis Result panel.
Cancel	Ignores the setting and closes this dialog box.

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		Page	Summary
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